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ABSTRACT

New England's economic competitiveness in a global economy and the role of the area's colleges and universities in contributing to that competitiveness are discussed, including a review of a similar analysis from the perspective of the state of Maine. The report examines information developed from a study having three research components: (1) the internationalization of the New England economy; (2) the attitudes of corporate, government, and university leaders on higher education's role in preparing for a global economy; and (3) a 40-campus study of what is and is not happening in this preparation. Recommendations at the regional level and for higher education institutions are presented. In addition, Maine's economy and the state's higher education institutions are examined in the context of being able to meet international competitiveness. Among the topics covered are: Maine's trading position and international awareness; business-university cooperation and coordination in developing competitiveness; R&D investments; funding availability; technology transfer and technical assistance; and educational needs. Recommendations are presented to enhance the Maine higher education community's response to the challenge of global competitiveness. The appendix includes a trade profile for Maine. (GLR)

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NEW ENGLAND BOARD OF HIGHER EDUCATION

ED326170

ECONOMIC COMPETITIVENESS AND INTERNATIONAL KNOWLEDGE

Special Policy Briefing
For
Maine Legislators

January 1989

A Regional Project on the Global Economy
and Higher Education in New England

HE 024 076

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A Special Policy Briefing
for
Maine Legislators

January 1989

Prepared
by
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PREFACE

The Regional Project on the Global Economy and Higher Education in New England

by

John C. Hoy
President
NEBHE

How important is the international dimension of New England's economy? How much do our colleges and universities contribute to the region's competitive position in the global economy?

To answer these questions, the New England Board of Higher Education has initiated a study of the role the region's institutions of higher education can be expected to play in the world marketplace. The study has three research components: an analysis of the internationalization of the New England economy; a region-wide assessment titled: The Future of New England Survey which reviewed the attitudes of the corporate, government and university leaders on what higher education should do to prepare us for the global economy; and a 40-campus study of what is and is not happening on our

campuses. NEBHE has also published these preliminary studies: Economic Competitiveness and International Knowledge and The Impact of Economic Globalization on Higher Education.

Corporate executives, economists and leaders in higher education have generously advised the Board and contributed to the preparation of the following perspectives and recommendations.

PERSPECTIVES

* The massive U.S. trade deficit is an urgent problem for New England and the nation. At both the regional and national levels, overcoming this condition requires an inter-related set of long-term strategic approaches involving business, government and education.

* New England has become a significant partner in the knowledge-based global economy. The export of innovative technological products and advanced professional services are among its greatest growth fields. The more the economy moves into high tech and sophisticated services, the more international it becomes. We face a fundamental change in our economic system as operations in fields ranging from finance to advanced manufacturing compete in global markets. New England's comparative advantage in high quality technology and knowledge-intensive services depends on a well-educated, high-skilled work force.

* In a knowledge-based global economy, we are competing not only with other economic systems, but with the research and educational systems of our competitors. Economic competitiveness requires educational effectiveness: our work force must have basic math and computer skills and scientific, technological and international knowledge at least equal to that of our major world competitors. Public understanding of the new global economy is crucial because international competitiveness will become central to the framework and

substance of state and federal policies affecting the domestic economy. A n the global economy already touches our lives directly every day: 80 percent of all U.S. goods now face international competition either at home or abroad.

* The challenges of the global economy confront not only business and public policy-makers. Colleges and universities are major stakeholders in the New England economy. They are the primary generators of new scientific and technical knowledge which is critical for economic competitiveness. They are the chief sources of new international understanding and the competencies increasingly required in most fields. Higher education is also a major global resource. Beyond its expertise concerning other countries and peoples, higher education is one of the strongest competitive features of the economies of New England and the nation. It is a major export sector providing services to an international clientele.

The central issue: How will higher education, government and business meet the challenges before them?

RECOMMENDATIONS AT THE REGIONAL LEVEL

1. Collect the facts. Throughout the planning stages of the NEBHE project, it has become clear that up-to-date information on state-by-state trade--export-import data--as well as factual information on direct foreign investment is woefully inadequate to keep up with changes in the economy. The most recent available trade data is for 1984. Four very significant years have passed during which international economic activity is estimated to have expanded at historic rates. We anticipate that in January 1989, the U.S. Department of Commerce will be in a position to release 1985-86 information which will be useful in updating state and regional analyses. Still, there is virtually no data on one of New England's most significant economic sectors: professional services such as scientific research, law medicine, management

consulting and higher education. Each New England state should implement and support a collaborative program to annually gather the facts concerning economic activity. In addition, a regional analysis of state and federal data should become a part of New England's global outreach program. With cooperation between NEBHE and regional business organizations, a clearinghouse should be created for the the development and dissemination of New England international economic data. The data should be disseminated to the region's governors, state legislators and leading executives, as well as colleges and universities.

2. Broaden the discussion. High-visibility regional conferences and greater communication with the media should be used to develop understanding of our region's place in the global economy. Conferences should include well-known business, higher education and government leaders. The conferences should address the importance of international trade and investment to New England, our region's competitiveness problems and their consequences, and ways to develop collaborative action among business, education and government to advance New England's competitiveness.

3. Seek to focus federal legislation. Our New England congressional delegation should consider ways to make the Higher Education Act (HEA) and other federal legislation key instruments of adaptation to the new global economy. The Congress, through the recent Omnibus Trade and Competitiveness Act, has taken the first steps by amending the HEA to authorize support for international business centers and technology transfer centers. The HEA's basic emphasis on access and opportunity is still needed, especially as we will need the contributions of all Americans to be economically competitive. It is becoming imperative, however, to move beyond access toward outcomes which will advance competitiveness.

RECOMMENDATIONS FOR HIGHER EDUCATION INSTITUTIONS

1. Initiate institutional planning. The implications of the global economy apply to all aspects of academic institutions' operations, including curriculum, faculty and library development, exchange programs, institutional linkages, external relations and administration. International competition elevates the importance of international education. We recommend that campuses undertake strategic planning aimed at evaluating their strengths, weaknesses and potential with regard to the global economy.

2. Build business-academic partnerships. Academic institutions are positive forces in attracting foreign investment to our communities. But the academic community is an underutilized resource for New England's international economic development. As a first step toward building partnerships beneficial to our campuses and region, we recommend that colleges and universities systematically address the strengths they can offer to the business community and to agencies such as regional development authorities.

3. Provide analysis. New England academic institutions are providing negligible data, analysis or perspective on the internationalization of the New England economy. The region has no academic institute focusing on New England international trade, investment or services, no institute focusing on the global economy more broadly, and no significant academic network of people working on these issues. Although there have been superb recent academic studies of the global business system, provocative analyses of competitiveness problems, and increased academic attention to business relations with Canada, our region lacks a strong institutionalized focus on its place in the global economy. Corporate and political leaders have no place to turn for an overview, and no place providing regionally focused material for teacher and citizen education. It is important for New England to have accurate and

comprehensive data and first-rate analysis. We recommend that our higher education institutions address this problem.

4. Focus on the global economy in the liberal arts. We asked corporate, government and higher education leaders to indicate the most important ways that colleges and universities can prepare our work force for a global economy. The respondents considered it most important to "design an undergraduate curriculum that ensures understanding of a global economy," even ranking this challenge ahead of the need to "expand the supply of scientifically and technically educated men and women." The liberal arts can familiarize undergraduate students with the concerns that will affect their lives and careers. The globalization of the economy and U.S. international competitiveness will clearly influence the lives of our graduates whether or not they become employed by firms involved in international trade. No institution offers an introductory course on the global economy. We recommend that institutions include a course on the global economy in their basic curricula and make materials available for in-service teacher education programs.

5. Develop faculty competencies in both business schools and the liberal arts. There is a shortage of qualified people with international backgrounds to serve on business school faculties, while there is a pervasive need for current faculty members to be able to integrate international knowledge into business school curricula. Among faculty members in the liberal arts, there is a parallel inadequacy to provide a global economic and business perspective. Moreover, our faculties have little understanding of the international dimensions of the New England economy. We recommend the creation of a faculty development program designed to produce multiplier effects on the campuses and to build strong bridges between business and liberal arts faculties.

6. Connect business studies with foreign language and world area studies. We find a growing need to link foreign language study and international courses with business programs. The need is particularly great with regard to Asia, where our negative trade balance coincides with weakness in academic preparation concerning the region and its culture. Businesses increasingly need people who combine area knowledge with business knowledge. We also find it increasingly important for those whose pursuit is area studies to understand the growing importance of economics in international relationships and the essential features of the global business system. We recommend that our higher education institutions emphasize these relationships.

7. Arrange internships in international business. New England students have few opportunities to benefit from experience in companies outside the United States or in internationally focused companies within New England. At the same time, the growth of foreign alumni contacts and the international aspects of New England-based companies, as well as the establishment of 1,500 foreign subsidiaries in New England, provide prospects for increasing the number of internationally focused internships. Internships contribute to student competence, cross-cultural understanding and career direction and momentum. Their availability alone signals the importance of international business and induces especially able students to include international aspects of business in their career planning. Lasting programs rather than ad hoc arrangements are needed to provide organizational bases for the expansion of opportunities. We recommend corporate-academic collaboration to create internship programs and suggest establishment of selection processes parallel to those used in awarding prestigious fellowships.

8. Provide continuing education and outreach to the business community. Corporate personnel and business faculty have indicated a widespread and increasing need for outreach programs to advance the understanding and competencies needed in the global economy. One clear audience is the high-tech community and its engineer-managers whose interest is in policy frameworks, international corporate coalitions, technology transfer and managing and negotiating across cultures. With notable exceptions, New England colleges and universities have not yet offered appropriate courses and seminars in convenient locations or at convenient times for business personnel, nor have they been utilizing new interactive and other learning technologies to reach these audiences. We recommend collaboration between business and higher education in conceptualization, market analysis and delivery of internationally relevant programs. We also recommend attention to the possibility of designing degree programs combining engineering and technical study with a program of international management.

PROJECT OUTLOOK

As the Regional Project on the Global Economy and Higher Education in New England proceeds, the NEBHE staff are confident that as state legislatures commence their 1989 agenda, NEBHE state house briefings for new and returning elected officials will be well-received throughout the region.

The project is a long-term effort on the part of NEBHE to assure consistent attention to disseminating the results of effective state initiatives throughout the region.

I. THE GLOBAL ECONOMIC CHALLENGE

The loss of international economic competitiveness experienced in the United States over the past two decades has been well-documented. The facts reveal a decline in productivity growth, periodic national and regional recessions; growth of federal budget deficits as well as international trade deficits; the decline in the U.S. share of worldwide gross national product; U.S. decline in nondefense research and development expenditures as a percent of U.S. GNP; the lagging performance of U.S. students behind those of other countries both on comparative achievement tests and decline in high school completion; the fall in the numbers of U.S. students pursuing doctorates in science and technical fields...the list of documented factors goes on. It has become clear that state initiatives in behalf of international competitiveness are required. This is a new role for the states--the territory is not well charted.

New England has fared far better than the nation as a whole over the past decade and continues to be cited both nationally and internationally as the prime example of the nation's capacity to reindustrialize. New England has experienced advanced industrial development based upon pre-eminent scientific infrastructure and technological innovation. The region's unequaled higher education infrastructure has been credited for its primary impact on New England's economic renewal.

Nonetheless, New England is now at a major crossroad. With an economy that is no longer in the vibrant phases of economic survival, how can the region sustain its recent success? More importantly, how can we meet the complex challenges of intense international economic competition? Economies capable of fostering a resourceful and flexible workforce that utilize swiftly

changing advanced technologies in an efficient and effective manner are those that will meet this challenge. The result: There are new demands on our corporations, governments and institutions of higher education. A well-educated workforce has been and will be the primary advantage.

The New England Board of Higher Education's Regional Project on the Global Economy and Higher Education was established in 1987. Through several background papers, a region-wide survey of corporate, education and government leaders, and publication of reports in Connection, New England's Journal of Higher Education and Economic Development, over the last two years, the NEBHE staff have analyzed new ways for the region's higher education community to join in partnership with New England businesses and governments to meet the global economic challenge. A case study* review explores initiatives that have been devised to address this issue. And finally, based upon this review, recommendations have been made to close the gap between actual and potential strategies devised to enhance New England's competiveness in commerce, industry and technological innovation. What follows is a summary of the issues as they pertain generally to the region and more specifically to the state of Maine.

The underlying premise of this project is that competition on a global basis, though not significantly different from competition at home, is a far more complex and demanding challenge. As New England continues to move from an industrial economy to a knowledge-intensive economy based upon emerging advanced technologies and sophisticated services, we are entering an era highly dependent upon skilled human capital development. For this reason alone, institutions of higher education will become key players in regional initiatives to meet the global economic imperatives.

The world economy, not the domestic economy, will grow significantly over the next several decades. New England's strong state and regional economies must be nurtured so they are well-positioned to take advantage of available worldwide markets. The global market place requires an understanding of the strengths of each state's economy in an international context and the interstate and national context which each will address in the decade ahead.

There are two underlying issues which the New England states must address with fresh policy initiatives and subsequent actions in order to meet the challenges of international economic realities:

- During the era of transformation from an industrial to a knowledge-intensive economy, human capital development has been the key to meeting the international economic challenge. Therefore, both the nation and New England continue to require high-quality higher education. Both short-term and long-term higher education initiatives must be stategically developed. The accurate response will require in-depth collaboration among business, education and government organizations..

- As many U.S. markets mature, international markets are beginning to grow. The world economy will experience greater levels of growth than the domestic economy over the next few decades. New England industries must adapt to this change if the regional economy is to continue to expand.

II. MAINE'S ECONOMY IN AN INTERNATIONAL CONTEXT

Foreign Investment in Maine

In the last year, the level of foreign investment in the United States has sparked concern. But studies by regional and national economists suggest that to date the impact is relatively small both in New England and in the nation. The investment by foreign-owned companies that has occurred has added diversity to local economies. This is a strength for New England over the long term. In any case, as global trade increases, foreign investment in the United States and by U.S. firms in other nations is very likely to continue increasing.

In Maine, however, foreign investment may be cause for greater concern than it is in other New England states. Employment by foreign-owned companies represents 5.9 percent of total employment, a larger share than in the other states of the region. (See Table 1.)

Maine holds another distinction related to foreign investment. In 1985 (the most recent year for which data is available), foreign affiliates owned more acres of land in Maine than in any other state. In addition, Maine ranked 6th in employment by foreign affiliates per 1,000 population, but ranked 45th in the actual number of foreign affiliates with property, plant and equipment in the state.

TABLE 1

Foreign Employment in New England: 1986

(numbers in thousands)

	Non-farm Employment* (1)	Employment in Foreign Companies+ (2)	Percent in Foreign Owned Companies**
CT	1,267.0	50.7	4.0%
ME	367.0	21.7	5.9%
MA	2,390.0	76.7	3.2%
NH	399.0	16.7	4.2%
RI	359.0	11.2	3.1%
VT	185.0	7.0	3.8%
NE	4,965.0	184.1	3.7

*The government and financial sectors were removed from total nonfarm employment for compatability purposes with non-bank company affiliates data.

+U.S. Department of Commerce data for non-bank foreign company affiliates

**Figures in Column (2) as percent of those in Column (1)

Note: Figures may not add up to totals due to rounding

Source: Wentrup, Hans J., "Foreign Ownership Has Only Mild Impact," New England Business, December 1988; and U.S. Department of Commerce, Statistical Abstract of the United States, 1988.

Manufactured Exports: Their Impact

The United States experienced flat growth in exports from 1981 through 1986, while import rates grew at approximately 7.5 percent per year. The nation saw modest improvement in exports, beginning in early 1987. By mid-1987, American exports were surging and continued to do so throughout 1988. Although continued strength in imports has prevented significant improvement to the trade balance, the U.S. trade deficit by September, 1988, shrank to its lowest level in three years.

The current export boom has been attributed, in part, to a weakened U.S. dollar, yet many economists note other important factors. These factors include: continued vitality in service exports (the trade balance for the service sector was in the black even when overall deficits were at record highs, but projections for 1988 suggest the service sector has lost strength), a new emphasis by the nation's exporters on making quality products and developing leading-edge technology, the return home of some manufacturing that had been shifted to nations with lower labor costs, and the relative strength of foreign economies, particularly Japan's and Europe's, that are able to absorb U.S. exports both now and in the forseeable future.

Still, exporting has not come naturally to U.S. companies. In 1987, exports represented only 5.4 percent of U.S. GNP, compared with 26 percent of West Germany's GNP, 25 percent of Canada's, and 10.5 percent of Japan's.

The United States has long been considered the world's richest market, and U.S. businesses have established a frame of reference that generally ends at the Atlantic and Pacific oceans. The breadth of the domestic market has left U.S. businesses relatively ignorant of foreign cultures, languages and markets. Now, we must expand our international awareness.

Dollar Value of Manufactured Exports

New England holds a unique position in the United States in terms of export industries. And the state of Maine holds a unique position within the region.

New England's manufactured exports totaled $20.9 billion in 1986, 15.5 percent more than in 1984. The region's largest exporting industries included non-electrical machinery, electronics, transportation equipment, scientific instruments, and fabricated metals. These five industries accounted for approximately 71 percent of the value of the region's manufactured exports.

Non-electrical machinery, the region's largest industry, totaled $5.5 billion in 1986, almost 20 percent above the 1984 level. Twelve percent of the dollar value of the nation's total exports in this industry were made in New England.

The region's exports of electronic equipment were valued at $4.1 billion, approximately 32 percent above the 1984 level. This industry accounted for 9.6 percent of the electronics industry's total dollar exports nationwide. Scientific instruments exported from New England ranked fourth in total dollar value. However, New England's export of scientific instruments represents almost 15 percent of the value of all scientific instruments exported from the United States.

Maine's five leading exports in the dollar value of shipments were paper products, electronics equipment, lumber and wood products, leather products, and non-electrical machinery (See Table 2). The value of leather industry exports increased substantially from 1984 to 1986, as did the value of exports by the food-products industry, which nearly doubled. Leather's ranking rose from 5th to 4th, and food products from 10th to 7th.

TABLE 2
Value of Top Ten Manufacturing Industries in Maine: 1984
(in millions of dollars)

INDUSTRY	1986 VALUE	1984 VALUE
PAPER AND ALLIED PRODUCTS	308.9	$288.1
ELECTRIC AND ELECTRONIC EQUIPMENT	254.9	251.3
LUMBER AND WOOD PRODUCTS	190.5	189.9
LEATHER AND LEATHER PRODUCTS	150.3	85.7
NON-ELECTRICAL MACHINERY	120.3	93.2
TEXTILE MILL PRODUCTS	55.4	47.8
FOOD AND KINDRED PRODUCTS	46.4	24.5
RUBBER AND MISC. PLASTIC PRODUCTS	39.7	37.8
CHEMICAL AND ALLIED PRODUCTS	36.1	30.2
FABRICATED METAL PRODUCTS	25.3	27.9

*Industries are listed in highest to lowest in order of the 1986 dollar value.

In real dollars, paper is the largest export industry. But the paper industry ranked 10th in terms of what share of total production was exported, suggesting that more of this industry's products remain in the United States. By the latter measure, electronic equipment, chemicals and allied products, and non-electrical machinery rank first throught third. More than 40 percent of the value of electronics, almost 34 percent of the value of chemical products and 25 percent of the value of non-electrical engineering industries were exports. Lumber, which was ranked fourth in terms of its value as a percent of total shipments, dropped to seventh. Whereas 17.1 percent of all lumber shipments was exported for further processing in 1984, only 15.8 percent were exported in 1986, suggesting that relatively more processing is being done in the United States. (See Table 3.)

TABLE 3

The Value of Manufactured Exports

as a Percent of Total Shipments by Industry:

Maine & the U.S.: 1984 and 1986

	1986		1984	
Industry+	Maine	United States	Maine	United States
Electric and Electronic Equipment	40.1	21.3	36.9	18.2
Chemicals and Allied Products	33.9	17.4	31.2	16.6
Machinery, except Electrical	25.0	22.8	20.4	21.5
Leather and Leather Products	21.3	8.8	10.2	6.8
Instruments and Related Products	16.0	16.5	12.7	15.4
Misc. Manufacturing Industries	15.9	8.2	15.5	7.4
Lumber and Wood Products	15.8	8.8	17.1	8.3
Rubber and Misc. Plastics Products	11.9	13.0	10.0	11.7
Textile Mill Products	10.4	8.2	9.6	7.4
Paper and Allied Products	10.1	12.0	8.9	10.6
Fabricated Metal Products	9.7	12.9	12.0	11.6
Food and Kindred Products	5.0	5.0	2.8	4.8
Printing and Publishing	3.6	4.3	3.0	4.2
Stone, Clay, and Glass Products	2.3	7.3	2.0	7.2
Furniture and Allied Products	2.3	2.8	2.0	2.7
Apparel and Other Textile Products	2.1	3.6	2.4	3.0
Petroleum and Coal Products	1.6	9.1	1.5	7.8
Primary Metal Industries	0.0	23.3	0.0	19.5
Transportation Equipment	0.0	13.6	0.0	12.8
Tobacco Products	0.0	12.1	0.0	14.6
All Industries	13.8	13.0	12.2	11.9

+Industries are listed in order of size (exports as percentage of total industries) in the state of Maine.

Note: Includes employment in the manufacture of goods that become components of other goods that are exported

Source: U.S. Bureau of the Census, Annual Survey of Manufactures, Origin of Exports of Manufactured Products, 1984 and 1986, Tables 4a and 5a.

Approximately 6.7 percent of the region's exported manufactured goods and .5 percent of the nation's are made in Maine. Almost 14 percent of all Maine's products, slightly more than the U.S. average in 1986, were exported to foreign nations. (See Table 4)

TABLE 4
Value of Manufacturing Industries Exports
New England and the U.S.: 1984 and 1986

	1984				1986			
	Value of Exports ($'s in millions)	Exports as % of Total Shipments	Share of N.E. Exports (in %)	Share of U.S. Exports (in %)	Value of Exports ($'s in millions)	Exports as % of Total Shipments	Share of N.E. Exports (in %)	Share of U.S. Exports (in %)
CT	5,435.5	15.6	30.0	2.0	6,186.0	17.2	29.6	2.1
ME	1,215.0	12.2	6.7	.5	1,393.0	13.8	6.7	.5
MA	8,767.6	15.0	48.4	3.3	9,724.7	15.9	46.6	3.3
NH	1,128.8	12.9	6.2	.4	1,661.7	17.6	8.0	.6
RI	946.4	11.1	5.2	.4	1,068.9	12.7	5.1	.4
VT	617.2	16.2	3.4	.2	833.9	20.1	4.0	.3
NE	18,110.5	14.5	100.0	6.8	20,868.2	16.2	100.0	7.1
US	268,278.0	11.9		100.0	294,339.5	13.0		

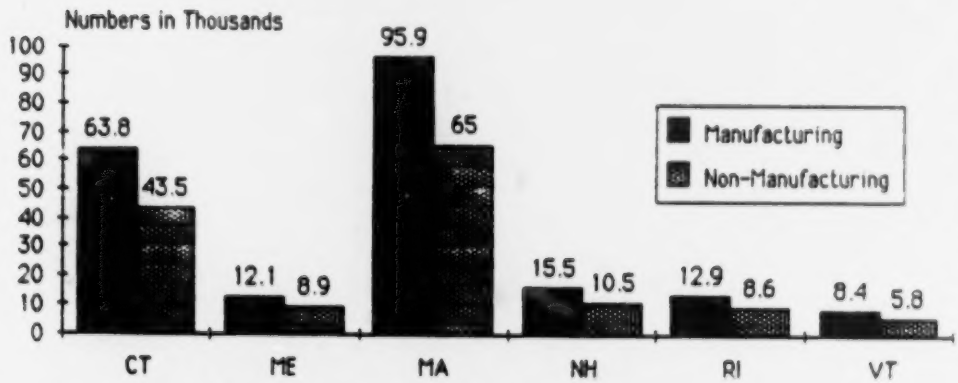
Note: Figures may not add up due to rounding.

Source: U.S. Bureau of the Census, Annual Survey of Manufactures, Origin of Exports of Manufactured Products, 1984 and 1986, Tables 4a and 5a.

Employment Related to Manufactured Exports

Throughout New England, export-related industries accounted for over 350,900 jobs in 1986, 12.5 percent more than in 1984. Approximately 208,600 of these jobs were in manufacturing industries, which directly produced the exports, while 142,300 were in export-related jobs in industries including transportation, communications, agriculture and business services (these same industries also export). Although New England is home to only 5 percent of the nation's population, it accounts for almost 8 percent of U.S. export-related employment. In addition, New Englanders hold 9 percent of all U.S. export-related manufacturing jobs. (See Figure 1 for more detail on manufacturing employment)

Employment Related to Manufactured Exports: 1986



Note: Includes employment in the manufacture of goods and services that are components of other goods that are exported.

Source: U.S. Bureau of the Census, Annual Survey of Manufactures, Origin of Exports of Manufactured Products, 1986, Table 2a.

In 1986, Maine industries accounted for 6 percent of New England's export employment. With approximately 18,800 export-related jobs in 1984, Maine industries lost far fewer export-related jobs (4 percent) from 1980 to 1984 compared both to the region (7.1 percent), as well as the nation (15 percent). For this reason, Maine's ranking for total export-related employment among all states rose from 28th in 1980 to 22nd in 1984. This suggests that even though the number of employees is small (only 3.6 percent of total civilian employment), many of those industries which did export were able to sustain strong sales and employment under the adverse conditions of a strong U.S. dollar in 1984. By 1986, employment grew to 21,000, almost 17 percent over the 1984 level. (See Table 5 below)

TABLE 5
Employment Related to Manufactured Exports in New England and the United States: 1980, 1984 and 1986

Export-Related Employment*

Area	In Thousands			As Percent of Total Civilian Employment			Rank Among 50 States		
	1980	1984	1986	1980	1984	1986	1980	1984	1986**
Connecticut	105.8	96.9	107.3	6.7	6.0	6.5	1	1	
Maine	19.5	18.8	21.0	4.2	3.6	4.0	28	22	
Massachusetts	151.4	144.9	160.9	5.5	5.0	5.5	11	3	
New Hampshire	23.0	21.6	26.0	5.4	4.5	5.2	13	8	
Rhode Island	25.4	19.1	21.5	5.9	4.3	4.5	5	11	
Vermont	11.2	11.1	14.2	4.7	4.4	5.1	20	9	
New England	336.3	312.6	350.9	5.5	5.0	5.5			
United States	4,808.3	4,096.7	4,576.6	4.8	3.8	4.1			

*Includes employment in the manufacture of goods and services that become components of other goods that are exported.

+Rank order is of export-related employment as percent of total civilian employment.

** Not yet available

Source: U.S. Bureau of the Census, Annual Survey of Manufactures, Origin of Exports of Manufactured Products, 1984 and 1986, Table 2a, and 1981, Table 2b.

This bodes well for Maine industries today because the U.S. dollar's decline provides a favorable environment for exports. Moreover, many economists believe the value of the dollar will be maintained at current or lower levels for at least the next three years. In addition, as previously suggested, economists believe the current export surge was caused by several factors other than a weaker dollar.

New England Trade With Canada

State and regional policy-making is hampered by a lack of timely U.S. data on imports and exports. Although U.S. Bureau of the Census data provide descriptive information about employment in export industries and the value of their products, the data is old, and little is known about the current scenario. In addition, little is known about the import side of the trade equation at the state level.

The Canadian Government, on the other hand, provides data on import/export trade among all the Canadian provinces and U.S. states within three months of the close of each calendar year. Information on trade over time between Canada and Maine is crucial because a large portion of Maine's exports are destined for Canadian provinces.

The Canadian Consulate located in Boston provided 1987 figures for the following analysis, including the following table (Table 6) which shows that although exports from Maine to Canada increased slightly from 1986 to 1987, the negative balance of trade also increased significantly because Canadian exports to Maine increased by almost 30 percent.

TABLE 6

New England State Trade with Canada: 1986 and 1987

(in millions of U.S. dollars)

	1986			1987			1987 over 1986 % Increase in Exports to Canada
	Imports from Canada	Exports to Canada	Trade Balance	Imports from Canada	Exports to Canada	Trade Balance	
CT	850.4	830.7	-19.7	829.1	823.7	-5.4	-.8%
ME	766.4	256.6	-509.8	995.3	262.8	-732.5	2.4%
MA	2,358.6	1,462.8	-895.8	2,706.4	1,773.9	-932.5	21.3%
NH	310.9	128.4	-124.6	244.6	139.0	-156.1	11.5%
RI	465.0	128.4	-336.6	244.6	139.0	-105.6	8.3%
VT	802.0	190.4	-611.6	1,034.2	367.8	-666.4	93.2%
NE	5,553.3	3,055.2	-2,498.1	6,173.4	3,574.9	-2598.5	17.0%

Note: Figures may not add up due to rounding

Source: Statistics Canada, "Domestic Exports/Imports to/from the United States, January to December 1987 (provided by the Canadian Consulate, Boston, MA); New England Council, "The U.S.-Canada Free Trade Agreement: A Study of the Costs and benefits to New England," March, 1988 (used the same data for 1986 provided by the Canadian Consulate.

Total trade between Maine and Canada consisted of 75 percent shipments from Canada in 1986 and 74 percent in 1987.

A 1986 comprehensive trade profile for Maine and Canada was prepared by the Northeast-Midwest Institute for the New England Council can be found in the Appendix.

The New England Council report suggests the U.S.-Canada Free Trade Agreement (FTA) will benefit the New England region overall. The Maine economy is expected to benefit significantly from the FTA as a result of stabilization of Canadian electricity supplies which could enable the state to attract new industry. Well-established existing industries such as electronics, telecommunications products, and industrial machines will benefit because tariffs will be eliminated. Maine is geographically positioned to take advantage of expanded trade, as long as industrialists in the state are properly educated about the specific benefits they stand to gain from expanding their exports.

Likewise, the integration of the Common Market economies of Western Europe into a single continental economy in 1992 could provide greater opportunities for international trade if American businesses prepare now.

Because the U.S. export boom started in mid-1987 and continued through 1988, the 1988 Canadian data should prove most interesting. NEBHE staff will obtain and analyze this 1988 data as it becomes available, and incorporate it into briefing materials for Maine legislative leaders later this year.

Potential Export Growth Among New England Small Businesses

Over the past 10 years, small businesses have been viewed as a key source of the nation's innovation and jobs. New England is unique among U.S. regions in that it is dominated by many small advanced-technology companies rather than large corporations. Data recently released by the U.S. Small Business

Administration (SBA) show that small and medium-sized firms make up approximately 97 percent of all firms in New England and in Maine. It may be New England's small businesses that provide the greatest potential for growth in regional exports.

Employment in New England small businesses increased 25 percent from 1976 to 1984; and small businesses provided 50 percent of all jobs in the region from 1982 to 1986.

The SBA estimates that 11,000 small businesses in the leading export industries of the nation have the capacity to export, but are not yet actively doing so. One reason: Small businesses face special challenges as exporters.

Firms with fewer than 20 employees often find exporting virtually impossible. They usually lack professional expertise in overseas markets. Obstacles include: foreign languages, time zones, taxes, regulations, international licenses and patent considerations, tariffs, customs inspection, laws, transportation and distribution systems, and varying cultural business practices.

Likewise, small businesses often lack the capital to sustain export operations through periods when the dollar's value is high relative to the currency of the importing nation. Although small businesses have lower levels of working capital than large corporations, they incur high overhead costs when beginning the endeavor. To make matters worse, export financing is very difficult to obtain, particularly for first-timers. And small businesses are often viewed as greater risks for financing.

Nonetheless, New England small businesses do dominate the advanced-technological industries that hold the greatest potential for export trade expansion. These small enterprises hold the key to expanding state economies through exporting, and it behooves the region to nurture them.

Findings/Recommendations

A review of the Maine economy in an international context suggests great promise, as well as certain key considerations for meeting the challenge of international economic competitiveness.

- U.S. citizens, in general, suffer from international myopia, and most lack a basic understanding of international issues. Basic skills of entry-level employees are often not as high as basic skills of entry-level employees in other developed nations. This hinders our ability to be economically competitive in world markets. Through attention to curriculum, higher education can foster long-term strategies to help the region address this issue.

- Although both New England and the state of Maine hold their own in the U.S. international trade arena, the degree of involvement is small. Only 4 percent of Maine's and 5.5 percent of New England's employment was export-related in 1986. Strategies must be designed to nurture industrial expansion in an international context.

- At the regional and state levels a large number of small firms are a dominant economic force, and these small businesses have certain competitive features that make them well-suited for international trade. But on the whole, the degree to which they are involved in international trade is minimal. The higher-education community, government and trade-related organizations can work together to devise short- and long-term solutions to the particular problems small businesses face as they approach the international arena.

- U.S. data regarding the international economic position of the states and their industries is terribly outdated at the time of its release. Steps should be taken to generate better data on a more timely basis to aid state and regional policymakers in developing the international dimensions of their economies.

III. International Trade Programs in Maine

Strategies to enhance international economic competitiveness already have been initiated at multiple levels. National, regional, state and local initiatives have been designed by governments, businesses and trade associations, as well as institutions of higher education. Although the projects vary widely, they generally aim to bolster economic development so

that an overall competitive advantage can be sustained, or they specifically promote international trade.

While large corporations generally have the financial and human resources to devise and sustain their own unique strategies for enhancing international trade, small and medium-size firms may lack both resources and be dependent upon other organizations for counseling, training, data analysis and market research, financial assistance, opportunities to attend trade shows and other services. A wide variety of such services are available to these smaller businesses.

Federal Trade Resources

On the federal level, international trade programs are sponsored by 10 agencies: the Agency for International Development, the departments of Agriculture, Commerce, State and Education, the Export-Import Bank, the Overseas Private Investment Corporation, the SBA, the Trade and Development Program and the Office of the U.S. Trade Representative.

A recent publication of the SBA is a must for all regional organizations as well as state agencies, business and trade associations and institutions of higher education that provide international trade counseling or technical assistance.

The SBA's Exporter's Guide to Federal Resources for Small Business (1988) outlines the multitude of federal programs designed to provide financial and/or technical support to U.S. companies seeking entry into or expansion in international markets. It is an excellent resource for Maine's small and medium-sized firms and for those advising them on the export process.

Two federal agencies involved in international trade deserve special attention. They are the Department of Commerce's International Trade Administration (ITA) and the SBA.

The International Trade Administration

ITA, established in 1980 to promote world trade, is the official U.S. government organization coordinating all issues concerning trade development, international economic policy and programs in the area of international commerce and import administration.

Two of ITA's four offices are charged with increasing export awareness and stimulating the export of goods and services. These offices provide individual export counseling, sponsor trade missions and fairs, develop catalog and video catalog exhibitions, provide electronic information or foreign sales leads, and conduct conferences and seminars to help companies enter new markets. Through ITA, last year 2,800 firms participated in 142 overseas trade fairs and missions reaching almost 5 million prospective buyers, agents and distributors. Projects are generally coordinated with local offices of the SBA, state agencies and area trade associations. ITA has 48 offices in the United States, as well as posts in more than 120 foreign countries.

Maine's ITA office is managed by the Boston District office, but certain ITA staff are located in Maine. Their proximity to the Maine World Trade Association, the state's Department of Economic and Community Development and the SBA office provide a valuable opportunity for greater coordination of efforts in Maine. ITA's biweekly publication, called Business America, is must reading for state and local leaders involved in international trade development as well as for current and future exporters.

Small Business Administration

The SBA offers a multitude of services for the small-business person, as well as for the individuals contemplating the creation of a small business

enterprise. Many SBA services are delivered locally through coordination with colleges and universities. While some SBA services are designed to assist small businesses with management in general, others are specifically geared toward providing international trade assistance, both financial and technical.

The SBA's Small Business Institutes (SBIs) offer free guidance and assistance to small businesses. The SBIs are staffed by college seniors and graduate business administration students (for academic credit) and their faculty advisors under SBA guidance. SBIs are located at Husson College, Thomas College, and the University of Maine's campuses, both at Orono and Presque Isle.

Small Business Development Centers (SBDCs) draw upon federal, state and local government resources, as well as the private sector and universities to provide small businesses with management and technical assistance, counseling and practical training. SBDCs in Maine are coordinated by the University of Southern Maine's School of Business Administration. SBDC satellite offices are located at the Androscoggin Valley Council of Governments (Auburn), Coastal Enterprises, Inc. (Wiscasset), Eastern Maine Development Corporation (Bangor), North Kennebec Regional Planning Commission (Winslow), Northern Maine Regional Planning Commission (Caribou), Southern Kennebec Planning and Development Council (Augusta) and the University of Maine at Machias.

Of all SBA programs, the International Trade Counseling and Training Program is the most specifically related to international trade. Established in the 1970s, this program's impact is increasing rapidly as the states grapple with international trade issues. This program provides one-time free legal advice for small- and medium-sized firms that are new to exporting, as well as counseling and financial assistance for managers of small businesses considering entry into international markets or expanding current export

operations. Much of this activity is managed by the SBA's Business Development staff and coordinated with the Department of Commerce's International Trade Administration.

Regional Initiatives

Certain regional organizations are involved in promoting international trade by New England businesses. They include the Small Business Association of New England, Massport's Trade Development Unit and the International Business Center of New England.

Small Business Association of New England

SBANE, a member organization for small businesses in the region maintains an international trade committee, called SINTRAC, which meets monthly to discuss problems and issues pertinent to exporting. This committee's 36 members are drawn from small businesses that are already exporting, as well as representatives of the U. S. Department of Commerce, SBA, and appropriate state offices throughout New England. The state of Maine is represented by Daniel Marra, president of the Maine World Trade Association. SINTRAC members also include representatives of a small number of business organizations serving the international trade community.

SINTRAC projects include training programs in export administration (co-sponsored with the International Business Center of New England), and export dialogue programs involving chief executive officers who are experienced in foreign trade and willing to share their experience in marketing and distribution, and their relationships with bankers, agents, brokers and freight forwarders. In 1989, SBANE's annual New England Business Conference, for the first time, will include an international trade component, with general sessions on international trade, selling products overseas,

financing international business, developing international joint ventures, the U.S.-Canada Free Trade Agreement and the European Community in 1992. The international component is likely to become a permanent part of the annual meeting.

Massport's Trade Development Unit

For more than a decade, the Trade Development Unit of Massport has provided referrals, research, marketing assistance and general guidance to small and medium-sized New England manufacturers seeking to begin exporting or expand current export operations. Each year, Massport assists more than 100 firms through market research and analysis of products and countries. Massport also sponsors trade shows, trade missions and business meetings, and provides general information on international business and export opportunities. In addition, for companies doing market research, Massport operates an international business library located at the World Trade Center in Boston. While the majority of Massport's clientele is based in Massachusetts, 10 percent to 25 percent is drawn from the remaining five New England states. Massport maintains international trade offices in London and Tokyo.

The International Business Center of New England

Established in 1956, the International Business Center of New England sponsors seminars and programs for businesses interested in international trade. The center coordinates its efforts with other regional organizations, as well as those serving the Greater Boston area.

Other Regional Programs

Several other regional organizations have provided policy studies and data analysis; others have coordinated workshops, seminars and meetings

related to the issue of international economic competitiveness. These include the New England Board of Higher Education, the New England Caucus of State Legislators, the New England Council and the New England Governor's Association.

A Key Program

Regional, state and local economic development groups, working with regional offices of the federal government, have designed an important program in conjunction with seven area colleges and universities, which is based on a prototype designed by the Wharton School of Business at the University of Pennsylvania and is similar to a UMASS/Amherst program that has served the business communities of central and western Massachusetts for more than five years.

Known as BEST (Boston's Export Strategy Team), this cooperative effort by Boston-area graduate business schools is designed to help local companies identify and develop strategies to capture foreign markets for their products or services. BEST may serve as a prototype for initiatives by colleges, universities and local economic development and trade organizations serving specific regions within each New England state. (See Appendix for some details about BEST)

State-Level Strategies in Maine

Given its size in terms of population and personal wealth, Maine is very progressive in matters of international trade. There are several reasons: First, because Maine borders two Canadian provinces and is close to others, an interest in nurturing industries to export goods and services has evolved naturally. With populations that are vastly larger than Maine's, the eastern-most provinces of Canada offer great potential as a market for the state's goods and services. In addition, Maine currently has a substantial

trade deficit with Canada which is cause for concern by government leaders and industrialists alike. Finally, because Maine's population, while small, is geographically dispersed and diverse both economically and culturally, state leaders have experience devising programs to cope with varying issues.

Many of Maine's programs, though not funded at high levels, have effectively taken advantage of existing organizational infrastructure. The programs benefit from a great deal of informal networking and cooperation, and because many of the programs are new--some were initiated in the late 1970s, but most in the late 1980s-- they are not hamstrung by bureaucratic traditions that in some states make new and innovative approaches difficult to generate.

The Maine Development Foundation

The state's role in economic development was boosted significantly in 1977 by an act of the Legislature which created the Maine Development Foundation (MDF), a private, non-profit statewide development corporation which promotes economic growth by addressing long-term issues affecting the Maine economy.

The MDF is supported by the Maine Legislature and several state agencies, as well as businesses and municipalities. Much of MDF's work involves building public-private partnerships at the local, state and regional levels. Among MDF creations: The first venture capital corporation (Maine Capital Corporation) funded by the legislature at $1 million in 1980 and now valued at $14 million through contributions by other sources; the Maine World Trade Association, established in 1980; and the Maine Science and Technology Commission, established in 1985 and officially designated as a state government agency in 1988.

MDF's programs include the Institute on the Maine Economy, a project designed to educate legislators and business leaders about Maine's changing

economy. In addition to issuing briefings on critical economic development issues and sponsoring local and statewide forums on economic issues, the Institute has forged a notable program of regional economic tours of businesses for legislators. Again, higher education plays a key role. These tours--about three a year--include visits to public and private educational institutions. And a general economic data book, as well as briefing materials, are prepared for the Institute's basic annual program for legislators and business leaders by staff of the University of Southern Maine's Center for Research and Advanced Study and the State's Planning Office.

In 1984, MDF established an Education-in-Residence program which places secondary and post-secondary teachers in Maine businesses for six to eight weeks during the summer to gain insight into career opportunities for students and to increase understanding of the educational skills that businesses want from their employees.

Finally, in 1988, MDF created the Maine Aspirations Compact to provide opportunities for business leaders and educators to work together forging local initiatives aimed at raising the expectations, improving the academic performance and expanding the educational, career and vocational choices of elementary- and secondary-school students. For example, in Aroostook County, 19 students from three high schools participated in an educational enrichment program at the University of New England in Biddeford. Financial support for this project came from area businesses.

MDF programs take a broad-based approach to economic development and incorporate the importance of education at all levels. They also promote long-term strategies to make the state more competitive in an international context.

Maine Science and Technology Commission

Once an MDF program and now a state-level agency, the Maine Science and Technology Commission, with approximately $1 million in funding in 1989, is establishing two Centers for Scientific Innovation as consortia among businesses and the academic community. This plan to nurture existing technological strengths in the state's economy now focuses on three major areas: the aquaculture industry, metals and electronic manufacturing and biotechnology. In addition, the Commission is establishing a research excellence partnership program with funding from the National Science Foundation.

Joint Standing Committee on Housing and Economic Development

Within the Legislature, a Joint Standing Committee on Economic Development was created in 1985. This committee, recently reauthorized, is now known as the Joint Standing Committee on Housing and Economic Development. In 1988, its work focused on the impact of global competition on the state's economy. In 1987, a Committee study of the 14 regional economies of Maine assessed the impact foreign trade and investment had upon the state and its sub-state economies. This resulted in a major policy analysis completed by the Legislature's Office of Policy and Legal Analysis in November 1988. The policy analysis is discussed below.

The Legislature's policy paper, entitled Study of the Impact of International Trade on Maine and the Potential Opportunities Available to the State, addressed the impact of international trade on the Maine economy, as well as the adequacy of state policies aimed at encouraging the private sector to compete effectively in an international environment.

The paper includes reviews of U.S. trade policies, international trade policies, and the U.S.-Canada Free Trade Agreement's potential impact, as well

as the needs of Maine's private sector firms. Also included are the results of a 15-state survey of programs designed to enhance international trade. This comprehensive report recommends five pieces of legislation to assist the state in evaluating and enhancing its international economic position. All the legislation calls for specific involvement of existing organizations, including institutions of higher education, state agencies and authorities and trade organizations. Legislation was expected to be filed in February 1989.

International Trade Initiatives

A broad spectrum of state-level programs in Maine have strong interests in international trades. The Maine-Canadian Legislative Advisory Office works with legislators, as well as both state and federal state agency staff, the governor's office, and university professors to keep them informed about current developments in the provinces of Canada. Developments related to public utilities, transportation, the environment, fish and wildlife and international trade are shared on a regular basis. The office was originally established in the 1970s in the governor's office, but is now permanently housed in the Legislature.

In addition, the governor has made international trade a priority for his administration, and serves on an federal advisory committee for international trade with Canada.

A New Initiative

The recently formed Department of Economic and Community Development (DECD) has been charged with managing the state's international commerce, but its funding is limited. Among other things, the department will oversee existing contractual arrangements the state has entered with the Maine World Trade Association to promote international trade. The Maine World Trade

Association is a membership organization which assists local companies interested in exporting, importing or developing joint ventures abroad. This kind of contractual arrangement provides a way for states to assist with the promotion of international trade, while taking advantage of established organizational structures. In addition, such arrangements facilitate the exchange of ideas between public officials and the businesses for whom programs are designed.

The DECD was appropriated $600,000 this past year to begin augmenting the activities now managed by the Maine World Trade Association, which include co-sponsoring catalog shows, trade shows and trade missions, following trade leads and providing export counseling, preliminary market research and training seminars and managing directories of Maine firms interested in international trade and export.

The DECD has adopted a sound approach to project development by viewing the state's university system as an excellent resource to assist with international trade promotion. The focus naturally is on trade with Canada. Under a contractual arrangment, the University of Maine at Orono's Canadian-American Center is completing two projects for DECD. The first is a step-by-step guide for small and medium-sized businesses interested in exporting to Canada. This guide is being prepared by an MBA student as a special academic project for credit. The second is an in-depth analysis of the impact of the U.S.-Canada Free Trade Agreement on the top 20 manufacturing industries of Maine.

Export information and assistance also is provided at the regional level in Maine through local Chambers of Commerce in the Kennebec Valley, Lewiston-Auburn area, and the Oxford Hills Area.

On a consultant basis, several specialized services are available to businesses wishing to export. They include: export management and export trading companies that serve as representatives to manufacturers;

international trade consultants; customs house brokers; international freight forwarders; translation services; and the international departments of banks. Most of these services are located in the Portland area, but some are also in Bangor and Augusta.

Findings

Although programs at the federal and regional levels have been in place for some time, those at the state level are relatively new. International trade has been considered the federal government's prerogative. But today states and municipalities have formulated international trade initiatives, and will most likely expand their roles. In the 1990s, the prerogative will be theirs.

Maine, like other states across the nation, is now building the infrastructure necessary to promote international trade. In fact, considering its small population and modest wealth, Maine has been very progressive in terms of international trade initiatives, largely because of its proximity to Canada.

Many of Maine's programs, though not funded at high levels, have taken advantage of existing organizational infrastructure. Three types of trade-related initiatives are at work in Maine:

- Programs that provide technical assistance and general information directly to potential export businesses (through trade missions and shows, counseling, financial assistance, market research, educational workshops, and the like).
- Policy studies and related projects that focus upon issues related to international trade and economic competitiveness.
- An initiative--now in the development stage--to coordinate research, development and technology transfer in such a way as to nurture young industries in the state through the creation of Centers for Scientific Innovation.

Table 7 outlines federal, regional, state and local programs that play key roles in Maine's trade-related and economic development activities. This table does not include institutions of Higher Education which will be discussed in the following section.

TABLE 7

Major Players Involved
in Enhancing International Economic Competiveness in Maine.*

Financial/Technical Assistance and Information

Dept. of Economic & Community Development (S/A)
Institute on the Maine Economy (S/NP)
International Business Center (R)
International Trade Administration (F)
Local Chambers of Commerce (L)
Maine Canadian Advisory Office (S/L)
Maine Capital Foundation (S/NP)
Maine World Trade Association (S/NP)
Massport's Trade Development Unit (R)
SBANE's International Trade Committee:
SINTRAC (R)
Small Business Administration (F)

Policy-Related Studies/Sessions and Data Analysis

Dept. of Economic & Community Development (S/A)
Joint Standing Committee on Housing and Economic Development (S/L).
Legislative Office of Policy and Legal Analysis (S/L)
Maine-Canadian Advisory Office (S/L)
New England Board of Higher Education (R)
New England Council (R)
New England Governor's Association (R)
State Planning Office (S/A)

Economic Development Initiatives

Department of Economic and Community Development (S/NP)
Maine Development Foundation (S/NP)
Joint Standing Committee on Housing and Economic Development (S/L)
State Planning Office

R & D Technology Transfer

Maine Science and Technology Commissions (S/A)

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*Excludes higher education initiatives which are covered in greater detail in the following section.

(F)=Federal; (L)=Local; (R)= Regional; (S/A)= State Agency; (S/L)=State Legislature; (S/NP)= State Non-Profit

Recommendations

Maine's short history in dealing with international economic competitiveness and the promotion of international trade is striking. NEBHE's analysis has found earnest enthusiasm on the parts of those involved and creativity in the strategies they have devised. However, we would like to note a few further considerations for the business, government, trade and other organizations involved:

- The current coordination of activities exists more by chance, than design. Those involved are knowledgeable about each other's programs. However, little planning takes place in order to evaluate collective strengths and weaknesses. Monthly or quarterly meetings of the various players concerned about international competitiveness and trade promotion would allow for a more synergistic approach to defining common problems and strategies to solve them. Maine's good start could be built on to the benefit of everyone.

- Although the creation of Maine's Science and Technology Commission is an important first step, Maine is behind many other states in addressing problems related to the coordination of research, development and technology transfer. Such coordination is the key to nurturing young industries and providing for the state's long-term economic welfare on both a domestic and international basis.

- Groups currently involved in bolstering the state's international trade activity have neglected to include one important resource until very recently. The university system is just now beginning to interact on a contractual basis with the Maine Department of Economic and Community Development to heighten state involvement in state-specific policy studies and technical assistance for international trade development. Although a great deal of important analysis is being generated in this field by the members of the academic community in Maine, (more detailed discussion follows) their findings are being shared within the higher education community on a national basis or with the international trade community, but rarely on a statewide basis. The involvement of faculty in the preparation of economic data for the Maine Institute is a good example of how this valuable resource might more effectively assist the state in coping with international trade promotion and more general economic development issues.

- A great deal of literature outlines the barriers that keep businesses from exporting, but a survey assessing which issues are most critical to Maine businesses would be valuable. From such an analysis, a state plan with both short- and long-term strategies can be devised. Such a plan might assign specific tasks to the different organizations that have a role to play in international trade and thereby, create a coordinated approach to international trade promotion.

IV. HIGHER EDUCATION AND INTERNATIONAL ECONOMIC COMPETITIVENESS

Because New England's economy increasingly is fueled by advanced technologies, skilled labor is critical to continued growth. International economic competition adds to our demand for a well-educated workforce, heightened levels of R&D and subsequent technological innovation. But there are signs indicating we are falling behind our economic competitors in these fundamental areas. On a national basis, the facts are disturbing:

Education and Training

- Between 20 million and 30 million adults in the United States are considered functionally illiterate.

- Participation and achievement by U.S. elementary and secondary-school students in science and math lag when compared with the performance of previous years and with the performance of students of other nations. Our middle and high school students have scored at or near the bottom on international math exams for the last several years. In addition, high school graduates in both Japan and West Germany, our major competitors, are stronger in basic educational skills. Merry I. White, an analyst of Japanese educational policy, suggests that Japanese high school graduates are as well educated as American college graduates and that any worker at a Japanese factory can be expected to understand statistical material, work from complex graphs and charts and perform sophisticated math.

- Though we boast that 50 percent of our high school graduates go on to college, only 70 percent of U.S. students complete high school, compared with Japan's 98 percent. "Their bottom half is beating our bottom half" according to economist Lester Thurow.

- U.S. professional service industries complain about the dearth of qualified workers for entry-level jobs usually filled by high school graduates. Likewise, U. S. manufacturers are finding it difficult to recruit workers who can understand robotics and computers.

- An estimated 75 percent of today's American workforce will need retraining by the year 2000.

- Recent studies suggest that U.S. universities are not turning out enough scientists and engineers--particularly at the master's and doctorate degree levels--to meet new demand in the leading-edge areas of high technology and advanced production systems. The number of engineering doctorates decreased from 2,500 in 1970 to 1,280 in 1985. In addition, only 53 percent of the engineering doctorates awarded by U.S. colleges were awarded to U.S. citizens or permanent

residents. And, a shortage of top-quality applicants is expected to greet the retirement of a generation of aging science and engineering faculty.

- Top-quality students are being steered toward the lucrative professions of finance and law, creating a brain drain in manufacturing industries. The study of manufacturing processes is being neglected.

International Awareness

- The United States is one of the few developed nations where students routinely graduate from high school without competence in a second language. According to figures provided by the Southern Regional Board of Education, only 8 percent of universities require foreign language for admission, and only 5 percent of college graduates are fluent in a second language. In the United States, a student can earn a doctorate without ever having taken a foreign language course. Nonetheless, the language of trade remains the language of the customer. If we do not understand the customer, we will be unable to trade our goods, services and ideas.

- U.S. students, workers and consumers lack understanding of global geography and of the cultural and political differences between nations. Economic development and trade association leaders told NEBHE staff that this lack of international cultural awareness is one of the most significant hurdles they face in encouraging export trade by New England businesses.

R&D Investment and Technology Transfer

- The U.S. leadership position in research and development (R&D) expenditures of 25 years ago faces a serious challenge. In 1962, the U.S. spent 2.7 percent of GNP on R&D, compared with 1.5 in Japan and 1.3 in West Germany. By 1985, the U.S. figure was still 2.7, but Japan's was 2.8 and West Germany's was 2.7.

- Non-defense R&D expenditures by the United States are well below both Japan's and West Germany's. Japan spent 2.8 percent of GNP on non-defense R&D in 1985, and West Germany spent 2.5 percent. The United States spent only 1.9.

- Although the United States leads the world in advanced technological industries, its annual growth rate between 1972 and 1985 was 7.6 percent, compared with Japan's 14 percent, suggesting Japan is more effective in technology transfer for high-quality product development.

- 1987 marked the second consecutive year that foreign firms topped the list of U.S. patents awarded. Japanese firms were first and second, bumping General Electric to third.

Education In The Global Economy

International competitiveness requires educational effectiveness. Having earned worldwide respect, our systems of higher education have at hand tremendous resources to share in solving the states' problems of economic competitiveness on several levels.

Many of the problems we face in terms of lagging worker competence and lacking international awareness have traditionally been viewed as problems of elementary and secondary education. But we can no longer afford to make that distinction. The strength of the U.S. system of higher education depends on the strength of education at lower levels. International economic competitiveness rests on the strength of both systems. For this reason, viewing the educational process as a continuum will allow more effective long-term solutions to the problems presented by the global economy.

In terms of basic literacy skills and educational level, the nation's workforce presumably falls around the middle when compared with other industrialized countries. But as our products become more highly technological and our markets become global, literacy demands increase dramatically. And the United States trails even some developing countries in initiatives on literacy, basic education and worker retraining. As a result, the United States faces competition from developing countries, which not only have lower labor costs, but also are making stronger efforts to train skilled, literate workers.

Literacy and Education in Maine

Maine is ranked 17th in the United States and 5th in New England in terms of adult literacy. Still, adult <u>illiteracy</u> is a serious problem in the state. Appoximately 11 percent of the adult population was considered

illiterate in 1985.

Maine has seen improvement in its high-school graduation rates during the 1980s. Only 70 percent of eligible students graduated in 1982, while 77 percent did in 1984 and 1986. Likewise, average SAT scores generally increased between 1982 and 1988, and greater numbers of students took the SATs: Only 48 percent did in 1982, but 59 percent did in 1988. Nonetheless, more improvement is necessary if the state is to compete with Japan and its 98 percent graduation rate.

Higher education statistics have not improved to a similar degree. In 1980, Maine ranked 33rd nationally, and last in New England, in the percentage of its population age 25 and older that had a college education. While the national average was 16.2 percent, and New England's average was 19.2 percent, Maine's was 14.4 percent.

In 1986, Maine's higher-education enrollment as a percent of 18 to 24-year olds was almost 34 percent. That's the lowest percentage in the region. Comparable figures for New England were almost 53 percent and for the United States, almost 47 percent. Due to the length of time it takes to complete college, changes in data at the higher-education level will take longer to produce.

A Long-Term Proposition

State, business and education leaders should realize that raising the educational level of the population is a long-term proposition, and quick fixes simply will not work. Raising the educational levels of Maine's young people in the short-term will help cope with adult illiteracy in the long-term, while leaders devise strategies to deal with the adult illiteracy that now exists.

Relative to recent concerns about the scientific and technically educated workforce, NEBHE completed a study in 1988 to assess the progress made by New England colleges and universities in supplying sufficient numbers of quality engineering graduates to meet industrial demands. The research showed that New England ranked first among all regions in enrollment of graduate students in science and engineering per 1,000 population. But while the region has responded well to estimated demands in engineering and related fields at the baccalaureate level, it is increasingly clear that insufficient numbers of doctorates are being awarded to meet the demand of high technology corporations and university faculties within the region.

A state-specific analysis of the University of Maine at Orono's capacity to meet the needs of Maine industries could be enlightening, particularly since the total numbers of bachelors degrees awarded in Maine declined dramatically from 1982 to 1987 while the number of master's and doctorate degrees conferred, small to begin with, increased slightly.

A strong effort has been made in Maine to increase the educational levels of residents. The Corporation for Enterprise Development gave Maine an "A" on its 1988 state-by-state report card for state educational initiatives. The state was ranked third nationally in this capacity. Public spending on education at all levels has been relatively high when compared to the actual wealth of Maine's residents. Moreover, student/teacher ratios in grades K-12 are very low (14.5), and teachers' salaries increased substantially between 1986 and 1987. As a result, Maine ranked fourth and sixth nationally in these two respective areas and has implemented more educational reforms than any other New England state.

Improvement of public schools was the No. 1 public policy priority of business, government and education leaders surveyed in NEBHE's 1987 Future of New England Survey. Maintaining a strong economy and improving higher

education ranked second and third out of nineteen issues for consideration. Initiatives such as the Maine Development Foundation's Aspiration Compact are critically important to dealing with the education and training problems of various communities. Such efforts should continue, and their results should be shared with appropriate civic and business leaders throughout the state as they begin devising strategies of their own. The concept might also be effective in dealing with worker training and retraining initiatives using college and university resources together with those of industry.

Some very creative programs have been initiated to deal with a variety of literacy problems in Maine. They include Maine's Statewide Literacy Coalition serving southern and central Maine, and the Literacy Challenge, a Bangor Daily News program with the Department of Education and Cultural Services, as well as various initiatives by some Vocational Technical Institutes.

Using higher education resources to help solve specific problems at all levels of education makes good sense in any state. But it is particularly important in Maine for several reasons: The state's relatively low personal wealth means new public initiatives may be fiscally impossible. Maine's higher education facilities are strategically located throughout the state, so school districts in each area, whether urban or rural, might effectively join together with higher education and business leaders to solve pressing problems. In addition, Maine's higher education system leads other states in its telecommunications capacity, a potentially important advantage in reaching citizens in small rural communities.

Lack of International Awareness

In 1987, NEBHE completed a comprehensive study of the ways New England college and universities were adapting curricula and related activities to provide new understanding and competencies that are necessary in a global

economy. Using a case study approach, NEBHE examined 40 colleges and universities, including public and independent two-year and four-year institutions, across the region. NEBHE considered institutional planning, business and liberal arts curricula, foreign languages, area studies, internationalization within various academic disciplines, foreign-student enrollment, study-abroad programs and library resources. The study found that the change occurring along the international dimension was one of the most powerful substantive developments in the history of higher education. But it also warned that more must be done.

Campus-based International Initiatives

What follows is a sampling of campus-based activities to promote international awareness among Maine students:

- The University of Southern Maine (USM) requires MBA students to complete a course in foreign trade, with an emphasis on the state's long-term economic development.
- Students from mainland China, who only recently began attending American universities, represent the second largest group of foreign students at USM, providing a unique opportunity for a new dimension of cultural information exchange on campus.
- Bowdoin College has designed its liberal arts curriculum to be international in scope, and has established a non-Western cultural requirement. Bowdoin College offers Asian Studies as a new academic discipline.
- Since 1980, Bates College has almost doubled its number of internationally focused economics courses.
- Under a cooperative arrangement, Bowdoin and Bates colleges are offering Chinese (at Bowdoin) and Japanese (at Bates) to all undergraduate students.
- The University of Maine at Orono (UMO) has created dual degree programs, coupling international affairs with anthropology, economics, history, language and political science. UMO requires all students to take a course with an international focus.

- More Canadian Studies activity is underway in New England than in any other region in the nation. And of the 13 New England programs, four are in Maine at: Bowdoin, Colby, and UM, both Orono and Presque Isle.

- UM at Orono's Canadian-American Center has been named one of three National Resource Centers for the study of Canada in consortium with the University of Vermont and the State University of New York, Plattsburg, under Title VI of the U.S. Higher Education Act.

- In 1986, UMO signed a comprehensive program for cooperation and exchange with the University of New Brunswick, establishing the most extensive relationship between any American and Canadian universities.

- In 1987 and 1988, five new tenure-track positions were established at UMO to complement the university's Canadian focus in history and the humanities. These appointments were in forest management, economics, business administration, political science and geography.

- UMO has joined the other five New England Land Grant Universities in the field of international business with sponsorship of a joint program in Grenoble.

- Colby, Bates and Bowdoin colleges, as well as UM at Farmington, Fort Kent, Machias, Orono and Presque Isle have formed the Maine Council on Canadian Studies.

- To enhance study-abroad opportunities, Bowdoin, Bates and Colby colleges have initiated a collaborative approach with a program in Sri Lanka. Without such collaboration, each of the three institutions would lack the critical to operate such programs.

Through 1986, Maine's colleges and universities, like their counterparts in the other New England states, have concentrated their internationalization efforts on curriculum development. Alhough these initiatives have been unique and impressive, comprehensive curricula planning typically has lacked focus on the global economy.

While foreign-language enrollments have risen sharply after a decade of decline, few business students study languages. Likewise there is very little global business perspective in liberal arts programs, even though most liberal arts students eventually go to work for firms, which are directly or indirectly involved in world trade.

In addition, study-abroad programs are generally available, but very few overseas internships focus on business. Very few post-doctoral research fellows are funded for overseas research positions. And those who do go, generally must complete a second post-doctoral assignment in the United States in order to be adequately connected to secure future employment. As a result, most are discouraged from going abroad.

Foreign-student Enrollment

Growth in foreign-student enrollment in New England as well as the nation has flattened during the 1980s in relation to the tremendous growth that took place in the 1960s and 1970s. But foreign-student enrollment in New England slowed to a lesser extent. The number of foreign students in New England grew from 23,191 in 1983-84, to 27,702 in 1987-88, less than 20 percent growth over the four-year period, but still substantial, compared with the national increase of 5 percent (339,000 to 356,000).

More striking is the relatively small number of Americans studying abroad. According to the Institute of International Education's 1986-87 "Open Doors" survey, 48,483 Americans were studying for credit abroad, compared to 349,609 foreign students studying for credit in the United States. Equally striking: While 80 percent of the Americans were studying in Western Europe and only 5.4 percent were studying in Asia, students from Asia represented about half of the foreign students in the United States. New England has proportionately more students from Europe and Canada and fewer from Asia than does the nation as a whole. Institutions in the three northern New England states have been especially attractive to Canadian students. A further characteristic of the assymmetry of the foreign-student exchange is evident in how foreign and American students, respectively choose their fields of study.

Foreign students are learning an enormous amount about science, engineering and business management in the United States. U.S. students overseas are learning almost nothing about science and business in their host countries. Primarily, U.S. students abroad are studying fields associated with U.S. undergraduate curriculum, dominated by Western history, philosophy and culture.

More must be done to encourage study-abroad in our institutions of higher education, not only in Western nations but throughout the world. In addition, the foreign students here in New England could serve as tremendous resources of cultural knowledge not just for college students and faculty, but for middle-school and high school students and the general public.

Business-Higher Education Lack Coordination

NEBHE's 1987 case study analysis of 40 New England colleges and universities suggests that the region's business, government, economic development and trade association leaders were increasingly focusing on international issues on a tract parallel to that of the region's colleges and universities, but that efforts by the different parties were rarely coordinated.

Although higher education has international resources relevant to the business community, and foreign investment tends to be attracted to areas offering educational advantages, New England communities had not yet developed business-higher education partnerships for international economic development. Maine is beginning to see its colleges and universities as a tremendous resource (see the following section covering technology transfer and technical assistance), but more should be done to maximize the use of this resource. Likewise, business leaders have expressed growing interest in the

international economy, yet continuing education and executive development programs related to international business issues are lacking.

It is critical that efforts be made to broaden the dialogue and improve international awareness among students, faculty and citizens in general.

R&D Investment and Technology Transfer

New England's leading edge in basic research is striking. In the 1970s, the region relied upon informal relationships between university researchers and resulting spinoff businesses. Not until the early 1980s did economic policy-makers and research universities across the nation begin to understand the serious implications for all sectors when" regional" economies failed or stagnated. The result was a concentrated effort to enhance university-based technology transfer and technical assistance initiatives in order to nurture the diversification of local economies.

But because the recession of the early 1980s did not severely affect the New England states, the promotion of technology transfer and technical assistance has lagged here. Now, as the region's economy seems to be peaking and international competition intensifies, purposeful action is critical to sustaining long-term economic development.

The nation's long-term commitment to research and development has served as a seedbed for new industrial products and processes, innovative capacity and productivity gains. Federal funding of basic and applied research has been vital in sustaining a prosperous economy. It has also created a partnership among government, business and academia. This partnership is responsible for our international leadership in scientific and technological discoveries. Since World War II, federal support for basic and applied research has grown substantially and New England organizations have

been leading recipients of the federal funds.

The region's strong R&D infrastructure, particularly at the university level, allowed for the evolution of the computer industry of the 1970s and the biotechnology and artificial intelligence industries developing in the 1980s. Nurturing R&D is crucial for state and regional economic development.

Maine's Share of Federal R&D

Although organizations in the state of Maine are funded at comparatively low levels by the federal government for R&D, Maine has improved its 49th ranking in 1980 to 46th in 1986, with a 37 percent increase in funding levels over the six-year period. The largest sources of federal R&D funds awarded to Maine are the Department of Defense (39.9 percent), Department of Health and Human Services (27.4 percent), the National Science Foundation (11.4 percent) and the Department of Agriculture (8.8). Maine witnessed a sharp increase in defense funds as a share of its total federal obligation between 1980 and 1986, and shot from 51st to 36th in Department of Defense funds awarded between 1980 and 1986. As a proportion of total awards to the state, awards to industry increased substantially--from 20.7 percent to 40.4 percent. Colleges and universities have maintained a constant level between 1980 and 1986 at around 20 percent as have non-profit institutes (from 28 percent of all funds awarded to the state in 1980 to 30 percent in 1986).

Maine's colleges and universities posted a one-year gain between 1985 and 1986 of 8 percent, compared with the region's 3.1 percent gain and the nation's 5.7 percent gain. Regionally, by this measure, Maine was second only to Rhode Island.

The largest share of federal R&D funds to Maine colleges and universities, 76 percent, was awarded by the Department of Education, while

almost 12 percent was awarded by the Department of Agriculture. Four percent of federal R&D funds were awarded by the Department of Health and Human Services.

Four universities in Maine rank among the top forty in New England in terms of university R&D obligations from all agencies: University of Maine at Orono (16), University of Southern Maine (20), University of Maine at Farmington (39) and University of Maine, Presque Isle (40).

In New England, UMO is second only to U/Mass Amherst in funds from the Department of Agriculture, and fourth, behind Boston University, U/Mass Amherst and Northeastern University, in funds awarded by the Department of Education. Also ranked in the top 30 regionally in federal education funds are USM (18) and UM, Augusta (25) and UM, Farmington (26).

Finally, UMO ranks 15th regionally in terms of R&D funds from the National Science Foundation.

R&D Expenditures at Colleges and Universities

On the expenditure side, colleges and universities receive 44 percent of their R&D funds form the federal government, substantially lower than the regional and national averages of 72 and 62 percent, respectively. However, almost 15 percent of Maine's expenditures were allocated by industry, versus New England's 7 percent and the nation's 6 percent. State government funds represented 4 percent of university R&D expenditures, double the region's average. Maine leads all six New England states in the percentage of institutional funds dedicated to R&D. Twenty-six percent of university based R&D is institutionally funded. The region's average is only 9 percent while the nation's is almost 17 percent.

Broken down by academic disciplines, the largest share of Maine's R&D expenditures occurred in the life sciences at almost 65 percent in 1986, compared with 50 percent in 1981. The share of expenditures in environmental sciences declined from almost 18 percent in 1981 to 7 percent in 1986, while engineering expenditures slipped from 10 percent to 8 percent of total expenditures.

In industrially sponsored research expenditures, UMO ranks 75th nationally and 8th regionally among all universities; the university also ranks 86th among public institutions of higher education nationally and fifth regionally in R&D expenditures from all sources.

National Institutes of Health Funding

In National Institutes of Health (NIH) funding--which is a measure of biomedical research activities--UMO ranked 248th nationally and 22nd regionally among all institutions of higher education. Bowdoin College ranked 380th nationally and 27th regionally, while the University of New England ranked 381st nationally and 28th regionally. Thirty-four colleges and universities in New England were awarded NIH funds. Finally, Maine Medical Center ranked 88th nationally and 20th regionally in NIH awards to independent hospitals.

Although R&D funding to Maine organizations is relatively low, these are areas of strength that can and are being nurtured. Maine's colleges and universities received a substantial increase in funds from 1985 to 1986 even though overall funding to all types of organizations declined slightly.

The large portion of college and university research expenditures from industrial sources indicates the potential for a vibrant working relationship between the two. In addition, the state, has funded college and

university research at a higher level than the New England average though it is still low by national standards. Research strengths appear to lay in the life sciences, followed by engineering and environmental sciences, both of which have slipped in terms of their proportionate share of R&D expenditures since 1981. The growth in the university-based life science research, higher levels of university funding from the departments of Agriculture and Education as well as the substantial level of university funding from industrial sources are strengths that the state might build upon to nurture technology transfer for economic benefit.

Technology Transfer and Technical Assistance

In the areas of technology transfer and technical assistance, many state colleges and universities have taken creative steps to help improve the health of local economies. Various initiatives have expanded technical and entrepreneurial assistance in economic and community planning, worker retraining, and general technology transfer as well as consultations to small and medium-sized firms, the creation of new business-university research parks, university industrial liason programs, scientist exchange programs and, technical and administrative support to university researchers interested in moving basic research forward for application. In addition, some initiatives have provided incubator space at university research facilities for new business ventures and established joint venture capital funds.

As noted in Part III of this paper, the creation of Maine's Science and Technology Commission is an important beginning in efforts to coordinate R&D and enhance technology transfer for Maine's economic benefit. Further, the Science and Technology Commission has evaluated potential areas of economic strength --aquaculture, metals and electronic manufacturing (small

instruments) and biotechnology--and intends to foster these industries. Universities play the leading role or, at least the key supporting role, in all projects under consideration by the commission at the present time.

The DECD has asserted the importance of higher education research centers as resources for technical assistance in dealing with international economic development issues that affect the state. In addition to the UMO Canadian Center's preparation of a guide for small and medium-sized businesses interested in exporting to Canada and a major analysis of the impact of the U.S.-Canada Free Trade Agreement upon the state's top 20 manufacturing industries, USM has proposed to establish through its School of Business Economics and Management an International Center with a focus upon Japan. The Japan-American Society in Portland is among resources the university will draw upon.

University-Based Technology Transfer

Some newer technology-transfer and technical-assistance initiatives have been generated by the universities themselves. Some are still in the planning stages. A sampling of Maine's university-based initiatives follows.

- USM, Thomas College, Westbrook College and the University of Maine System's Schools of Business Administration, through their international business courses, are providing hands-on research projects and internships that provide assistance ranging from analysis of international activities to development of a comprehensive international marketing strategy. Businesses are informed of these opportunities through the Maine World Trade Association.
- USM's Center for Research and Advanced Study prepares a comprehensive economic data book and detailed economic briefing books for tours by legislators of different areas of the state three times a year.

- The Office of International Research and Educational Programs at UMO publishes an annual directory of faculties' research and educational strengths that might be effectively applied to international developmental initiatives. The 1988 edition was expanded to be a University of Maine System directory that includes all seven campuses. The directory covers all academic disciplines.

- The Canadian-American Center at the University of Maine, Orono, is a national resource center promoting the study of Canada. The Center holds workshops and conferences on the Free Trade Agreement, defining implications for industry in specific ways. In addition, the Center has received funding from the William H. Donner Foundation and the Business Fund for Canadian Studies in the U.S. (a non-profit Canadian foundation) to look at the relationship of natural resource industries in Maine with those of Canada and to start a new public policy paper series exploring cultural, economic and general relations between Canada and Maine. Both types of initiatives are directed to policy-makers, academic communities and the general public. Also a School Outreach Program operated through the center provides curriculum development guides and on-site seminars to promote the integration of Canadian studies in K-12 curriculum throughout Maine.

- All campuses in the University of Maine System have enhanced technical assistance related to Canadian Studies or concerns: The Farmington campus has established a Western Mountains Alliance with Quebec to explore cultural and community relations; the UMO law school has expanded courses and added continuing education conferences in dispute resolution related to Canadian and U.S. trade; through the state's Science and Technology Commission, the Presque Isle campus has established the Maine Research and Productivity Center which works closely with the University of New Brunswick's Research and Productivity Council, now in operation for 25 years; USM has expanded policy research in international commerce and relations focusing on policy that affects Maine's trade with Canada, northern Europe and Japan.

- UM Presque Isle's statewide Research and Productivity Center in four months of existence has begun the transfer of university-based research for the marine-resource industry and for local waste management, and has developed new food products and provided marketing consultation services to small businesses.

- UMO established a Corporate Liason Program in 1988 through its Business Industrial and Governmental Relations office. The program includes the Center for Innovation and Entrepreneurship, the Department of Industrial Cooperation and technology transfer services through the Chemistry Department, the Department of Mechanical Engineering, the Laboratory for Surface Science and Technology, the Division of Robotics and Computer Vision and the Digital Design Laboratory .

- Maine Tech Center is expected to be the first of several buildings at an extensive science and research park, opened in 1988 adjacent to the UMO campus. This was a joint venture by the town of Orono, the university and a local developer. Maine Tech Center is the home of the university's Corporate Liason Outreach Service operated by the Office of Business, Industrial and Governmental Relations.

- USM is applying for funds through DECD to establish an International Center through its School of Business, Economics and Management.

- USM's recently completed four-year plan includes a goal to bring university resources to bear on helping the state meet challenges related to international economic competitiveness.

Coordinating Efforts

As noted previously, NEBHE's 1987 case study revealed campus efforts toward internationalization were not coordinated with those of business, government and the economic development community. This update has found that in 1988 and 1989, plans were implemented to introduce that coordination.

University faculty and administrators have traditionally shared their work within academia. Findings have been shared beyond the academic community on occasion, but generally only at a national level. Even the UMO Directory of International Researchers has been used in this fashion, although it would have its greatest impact on Maine's government and business communities. Only in the last few years has attention shifted to the state level.

Because this reaching out to an expanded community is very new to many academic researchers and administrators, the state and business leaders should continue to take steps to foster this type of relationship. With continued efforts to coordinate various activies, Maine campuses, businesses, government offices and economic development groups are laying a solid foundation to ensure the state's global economic competitiveness.

V. Recommendations

The following recommendations aim to enhance the Maine higher education community's response to the challenge of global economic competitiveness. These recommendations are not strictly higher education initiatives, but all require the diversity of talent that exists in the academic community in partnership with business and government leaders.

Education and Training

Leaders of higher education, government and business should collaborate to:

- Create a compact (following the Maine Aspirations Compact model) to address worker education, training and retraining, as well as education and training for welfare recipients.
- Under the direction of DECD, use university resources to initiate a study of industrial demand for scientists and engineers on a statewide basis (similar to that which is done for Massachusetts by the High Tech Council).

Leaders of higher education should:

- Create campus-based global education centers to: help local teachers at all levels upgrade basic education; develop model instructional materials; coordinate a university-based speaker's bureau to encourage early interest in science and engineering careers; and coordinte higher education's telecommunications systems to expand opportunities for science and math education in smaller, rural areas.

International Awareness

Leaders of higher education, government and business should collaborate to:

- Establish a mechanism for Maine businesses and the state to fund study-abroad programs in non-Western regions.

Leaders of higher education should:

- Use global education centers to: coordinate efforts by local teachers at all levels to add an international focus to curricula; and initiate programs that will expand opportunities for a wide variety of foreign-language study in middle and high schools and international affairs courses in high schools, using the universities' telecommunications systems to reach rural areas.

- Provide opportunities for high school students to participate in foreign-language and international affairs programs at campus-based summer institutes. Also, use the summer institutes to provide teachers at all levels with new internationally focused curricular resources.

- Encourage Maine firms doing business abroad to serve as resources in expanding internship possibilities for students.

- Include an assessment of international awareness among teacher-certification requirements.

- Focus on the global economy in liberal arts and in general education to familiarize undergraduate students with the larger international concerns that will have an impact upon their lives and careers.

- Establish dual-degree programs, particularly for business and engineering students so that they can gain knowledge of a given area, learn a foreign language, have opportunities for study-abroad programs that provide internships and related to their fields of study.

- Initiate continuing education and executive development programs in international business, international affairs and foreign languages, with particular attention to international management courses or programs for engineers and other high technology personnel.

- Reinstate language requirements for admission to four-year institutions of higher education.

- Make sure foreign students on campuses are representative of all world regions, and encourage their involvement in local programs designed to enhance international awareness.

The New England Board of Higher Education should:

- Complete a regionwide review to determine which of New England's trading partners or potential trading partners are inadequately served by campus-based area-studies centers, and encourage creation of new centers to fill the gaps.

- Encourage new and existing area-studies centers to establish: semester exchange programs in international affairs, foreign language, liberal arts and business; share relevant studies on trade, regulatory, monetary and economic development policy studies with government agencies and legislators as requested throughout New England; provide seminars and handbooks for New England business people who want to begin exporting or expand current export operations; and develop relationships with foreign institutions to provide a framework for faculty and student exchange, as well as joint research and curriculum development opportunities.

R&D Investment and Technology Transfer

Leaders of higher education, government and business should collaborate to:

- Establish a statewide technology transfer council with representatives of business and university-based technology transfer centers, and under the direction of the Maine Science and Technology Commission, to coordinate: development of research parks, provision of seed money or venture capital, creation of incubators for starting new companies, and evaluation of scientific and technological strengths that could be nurtured for economic diversification.

- Evaluate Maine's R&D funding levels and assess research projects that, with funding, could contribute to long-term economic development.

- Establish a mechanism for businesses and the state to provide funding for expanded seminar programs, allowing exchange between university R&D staff and state industrial R&D staff.

Leaders of higher education should:

- Research universities and technology-based companies of New England should evaluate ways for faculty, post-doctoral students, and industrial engineers and scientists of new England to pursue research sabbaticals in other nations.

- The University of Maine at Orono's Office of International Research and Educational Programs should expand its annual directory of faculty research expertise to include activities of the private institutions of higher education in the state. In addition, the directory should be disseminated to the high-technology and international business communities throughout the state.

- Institutions of higher education should create interdisciplinary institutes of industrial competitiveness between schools of business and engineering to develop an integrated approach to enhancing competitiveness.

The Board

The New England Board of Higher Education is a congressionally authorized regional, noprofit agency that seeks to encourage cooperation and efficient use of resources among colleges and universities in New England. NEBHE's focus in research and publications programs has primarily been on higher education's impact on the region's economic development. Basic funding comes from the region's six states and New England-based corporations. Offices are at 45 Temple Place, Boston, Massachusetts. Phone (617)357-9620.

APPENDIX

Who are the business schools involved in BEST?

The business schools involved are:

- Babson College
- Bentley College
- Boston College
- Bunker Hill Community College
- Northeastern University
- Suffolk University
- University of Massachusetts/Boston

Who are the organizations participating in BEST?

Public and private organizations involved in the program include the:

- City of Boston's Economic Development and Industrial Corporation (EDIC)
- International Coordinating Council (ICC)
- International Business Center
- Massport's Foreign Trade Unit
- Massachusetts Industrial Financing Authority (MIFA)
- State's Office of International Trade and Investment (OITI)
- Small Business Administration (SBA)
- Small Business Association of New England (SBANE)
- World Trade Institute

What does it cost to participate in BEST?

A $200 fee is charged to participate in BEST. It covers the incidental costs students will incur during the semester in preparing the feasibility study (phone calls, transportation, printing, etc.) and the administrative costs of running the overall BEST program.

For further information about BEST, please give one of us a call.

Andrew Bendheim
Massport, 439-5560

Paul Horn
EDIC/Boston,725-3342

Charlie van Nederpelt
Boston College, 552-3167

August, 1988

Boston's Export Strategy Team

B.E.S.T.

A Program to Assist Small Businesses in the Exploration of International Marketing Opportunities

A cooperative effort of Boston-area Business Schools and International Trade Organizations

WHAT YOU SHOULD KNOW ABOUT THE

B.E.S.T.

Boston's Export Strategy Team

What is BEST?

BEST is a cooperative effort by leading Boston-area graduate business schools to help local companies identify and develop strategies to capture foreign markets for their products or services. By combining university research talent with the expertise and resources of local economic development and trade organizations, BEST offers companies a unique opportunity to understand and pursue their export potential.

Who should participate in BEST?

BEST is specifically designed for Boston-area companies serious about making the most of their export potential.

How will BEST work for you?

Participation in BEST provides your company with three basic services:

1. A Practical Guide for Implementing Your Export Program. A professional market analysis and feasability study, prepared by a graduate student consulting team closely supervised by a business school faculty member in international marketing will provide your company with an export strategy. This will include recommendations on:

- o alternative export markets
- o marketing objectives
- o marketing strategies
- o product adjustments
- o promotion mix
- o distribution channels
- o pricing strategies

2.) Speakers on Export Topics. Trade experts will offer practical perspectives on important export topics: on the "nuts and bolts" of exporting as well as current trends. Specific topics will be chosen to reflect your company's particular export concerns. The discussions will center on developing strategic responses to assist you in strengthening your position in international trade.

3.) Ongoing Assistance. Through its public and private sector sponsors, BEST will assist you further in obtaining information and services necessary to implement your export program. Organizations such as the World Trade Institute, Massport's Foreign Trade Unit, the State's Office of International Trade and Investment, and the Small Business Administration will help BEST clients take advantage of their respective trade libraries and data bases. The City of Boston's Economic Development and Industrial Corporation (EDIC), and the Massachusetts Industrial Finance Authority (MIFA) will provide financing assistance to exporters.

APPENDIX

THE U.S. - CANADA FREE TRADE AGREEMENT

"A Study of the Costs and Benefits to New England"

A New England Council Report

March 1988

12. Trade Profile for Maine

Maine ranks third in New England for total trade with Canada, behind Massachusetts and Connecticut. Maine imported $766 million and exported $257 million in goods, which translates into a deficit of $509 million. The state ranks fourth in New England in imports from Canada, but third in the region in shipments to Canada. As shown in Table 2, Maine's trade with Canada heavily leans in Canada's favor, with 75 percent of the total trade between them consisting of shipments from Canada. Figure 4 illustrates the fact that most of this imbalance lies in Canada's shipments of fabricated materials.

Maine Exports

Maine's shipments to Canada are about evenly divided among crude materials, fabricated materials and end products. At this aggregate level, Maine boasts the greatest export diversity among the six states.

As shown in Table 5, the state's leading export to Canada is crude wood materials ($73 million in 1986), which undergo further processing in Canada. Maine ships considerably smaller quantities of lumber ($8.2 million), much of which is softwood. The Canadian lumber industry is well subsidized and Canada has never depended heavily on the United States for wood. While the FTA would preserve the duty-free status of lumber, it would not address the subsidy issue. In addition to lumber, Maine exports a large volume of paper and paperboard, with shipments valued at $45 million in 1986. Maine does not ship very much in the way of food or agricultural products to Canada, with the exception of seafood ($10.1 million), and a smaller amount of fruits and meat.

Maine ships a large variety of end products in moderate amounts. Telecommunications equipment exports lead this category, with shipments valued at $8 million in 1986. Canada has maintained strong protective policies on its telecommunication market. In addition to high tariffs, the Canadian industry has enjoyed protection from imports as a result of a preferential supplier arrangement between Bell Canada and Northern Telecom. Canada also has used equipment standards to effectively discriminate against U.S. suppliers. These

Figure 4

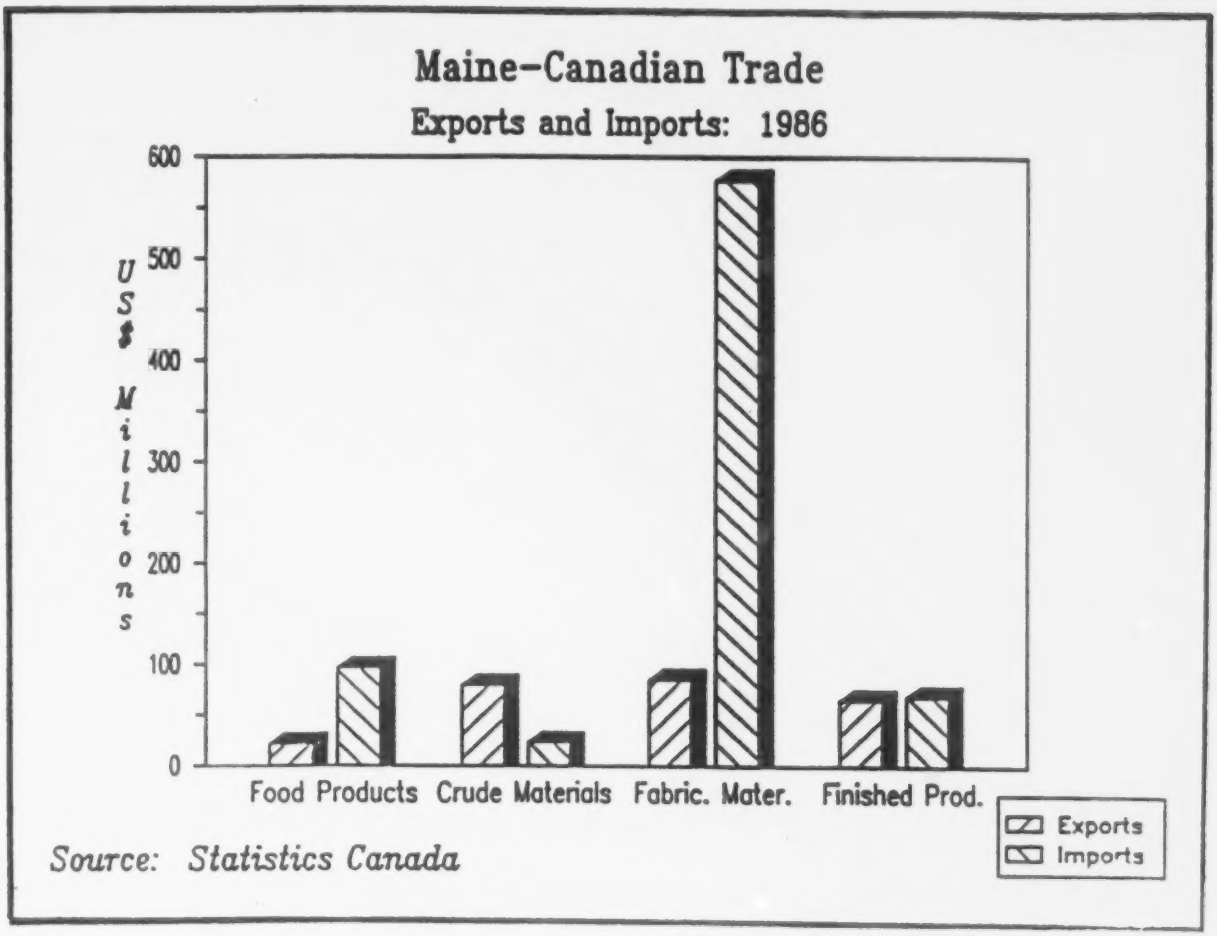
Maine-Canadian Trade
Exports and Imports: 1986
US$ Millions
600
500
400
300
200
100
0
Food Products
Crude Materials
Fabric. Mater.
Finished Prod.
Exports
Imports
Source: Statistics Canada

Table 5
Leading Maine Exports to Canada
By Major Commodity Category: 1986

Commodity	U.S. $1000s	Percent of total category
Food, Feed, Beverages, Tobacco		
Fish and Fish Products	10,186	47
Fruit and Fruit Products	3,368	16
Meat and Meat Products	2,083	10
Live Animals	1,618	7
Fodder and Feed	1,478	7
Vegetables and Vegetable Products	796	4
Total for six leading exports	19,529	90
Total for commodity category	21,665	
Crude Materials		
Crude Wood Materials	73,025	92
Fur Skins and other Animal Products	1,915	2
Metal Ore, Iron and Scrap	762	1
Abrasives and other Crude Non-metallic Minerals	707	1
Wool and Man-Made Fibers	426	1
Total for five leading exports	76,835	97
Total for commodity category	79,483	
Fabricated Materials		
Paper and Paperboard	45,169	53
Lumber	8,219	10
Wood Pulp	8,113	10
Plastic Materials	4,499	5
Fuel Oil and Other Petroleum Products	3,702	4
Textile Fabricated Materials	3,600	4
Metals and Basic Metal Products	3,543	4
Plywood, Veneer and Other Wood Fabricated Materials	2,857	3
Leather and Leather Materials	1,385	2
Total for nine leading exports	81,087	95
Total for commodity category	85,294	

(Table 5 continued)

Commodity	U.S. $1000s	Percent of total category
Finished Products		
Telecommunication Equipment	8,284	13
Semiconductors and Tubes	4,512	7
Motor Vehicle Parts	4,099	6
Electrical Lighting and Equipment	4,082	6
Special Industry Machinery	3,656	6
Sanitation and Safety Equipment	2,968	5
Computers	2,967	5
Pulp and Paper Industries Machinery	2,915	4
Containers and Closures	2,449	4
Footwear	2,337	4
Service Industry Equipment	2,318	4
Engines, Bearings, Pumps and other General Industrial Machinery	2,236	3
Metalworking Machinery	1,594	2
Construction and Maintenance Machinery	1,436	2
Stationer's and Office Supplies	1,252	2
Tractors and Agricultural Machinery	1,063	2
Medical Supplies	1,020	2
Motor Vehicles	456	1
Total for 18 leading exports	49,643	76
Total for Commodity Category	65,068	

SOURCE: Staff calculations from Statistics Canada, "Domestic Exports/Imports to/from the U.S.A, January to December, 1986."

barriers are described in more detail in the manufactured goods section of this report.

Semiconductor and computer exports from Maine amounted to $4 million and $3 million, respectively, in 1986. Both products face a 3.9 percent Canadian tariff; the FTA would eliminate the tariff on computer chips immediately, and phase out the tariff on computer equipment over five years. Exports of another leading product, motor vehicles and parts, accounted for $5 million in 1986. Bilateral trade in automotive goods would continue to be governed by the Auto Pact, discussed further in the automotive section of this report. Other finished goods shipped from Maine to Canada include industrial machinery and equipment, containers and closures, and footwear.

Maine Imports

As shown in Figure 4, Maine's imports from Canada are concentrated in fabricated materials, processed further in the state. Wood pulp is the leading import item in this category, with shipments valued at over $226 million in 1986 (see Table 6). Wood pulp accounts for 32 percent of total imports to the state from Canada and is used to make paper and similar products, some of which are sold back to Canada.

Maine also relies heavily on Canada to meet its energy needs, particularly electricity. In 1986, Maine imported more electricity from Canada than the other New England states, with shipments reaching $107 million, or 14 percent of its total Canadian imports. Other major energy imports include petroleum products ($88 million) and coal products ($48 million). As discussed earlier in this report, the FTA would probably stabilize energy supplies for the import-dependent New England states by providing long-term access to Canadian hydropower and vast natural gas reserves.

Maine imports of agricultural products rank behind fabricated materials, with the exception of fish and fish products. In fact, the state imports seven times more seafood products than it exports north ($71.4 million in imports, compared to $10.2 million in exports). Imports primarily consist of processed fish; exports from the state are mostly unprocessed fish and marine animals. Most unprocessed fish is shipped duty-free, while processed fish faces small tariffs which would be eliminated over five years under the FTA.

Table 6
Leading Maine Imports from Canada
By Major Commodity Category: 1986

Commodity	U.S. $1000s	Percent of total category
Food, Feed, Beverages, Tobacco		
Fish and Fish Products	71,418	74
Vegetables and Vegetable Products	6,782	7
Meat	6,130	6
Fruits and Fruit Preparations	3,780	4
Feeds and Fodder	2,465	3
Whiskey and Other Beverages	1,924	2
Total for six leading exports	92,498	96
Total for commodity category	96,646	
Crude Materials		
Pulpwood and Pulpwood Chips	8,979	39
Textile and Related Fibers	3,553	15
Crudewood Products	2,417	10
Seeds, Nuts, Kernels and Other Crude Vegetable Products	2,400	10
Rawhides, Skins and Other Crude Animal Products	1,090	5
Sulphur and other Crude Non-metallic Minerals	1,980	9
Total for six leading exports	20,419	88
Total for commodity category	23,131	
Fabricated Materials		
Wood Pulp	226,313	39
Electricity	107,644	19
Petroleum and Coal Products	87,527	15
Lumber	47,895	8
Newsprint and other Paper	25,154	4
Organic and Inorganic Chemicals	20,819	4
Metals and Basic Metal Products	18,208	3
Abrasives and other Basic Non-metallic Mineral Products	16,972	3
Synthetic Rubber and Plastic Materials	7,524	1
Fertilizers	7,022	1
Shingles, Plywood and other Wood Fabricated Products	6,778	1
Total for 11 leading exports	571,856	99
Total for commodity category	577,257	

(Table 6 continued)

Commodity	U.S. $1000s	Percent of total category
Finished Products		
Motor Vehicles	8,415	12
Special Industry Machinery	7,916	11
Pulp and Papers Industry Machinery	5,740	8
Materials Handling Equipment	5,407	8
Hand Tools and Equipment	5,306	8
Prefabricated Buildings and Structures	4,880	7
Motor Vehicle Parts	4,369	6
Engines, Turbines and other General Purpose Industrial Machinery	4,220	6
Ships, Boats and Parts	4,019	6
Containers and Closures	3,911	6
Agricultural Machinery	2,252	3
Telecommunication Equipment and Parts	2,177	3
Footwear	1,588	2
Heating and Refrigeration	1,143	2
Electric Lighting and Equipment	801	1
Total for leading 15 exports	62,144	90
Total for commodity category	69,023	

SOURCE: Staff calculations from Statistics Canada, "Domestic Exports/Imports to/from the U.S.A, January to December, 1986."

Finished goods are a relatively small part of Maine's imports from Canada. Automotive products, including motor vehicles and parts, lead this import category, with $13 million worth of shipments in 1986. Other leading finished goods imported from Canada include industrial machinery and equipment, tools, prefabricated structures, ships and boats, containers, and telecommunications equipment.

Summary

The FTA could have significant impact on Maine's economy. One of the greatest benefits may come from the stabilization of the Canadian electricity supply to Maine. A dependable energy supply, which is essential to any major manufacturer, could attract new industry and employment opportunities to Maine.

Existing industries stand to gain as well. The computer and telecommunications industries, already well-established in Maine, could increase their share of the Canadian market with the elimination of the tariffs. However, if nothing is done about restricitve equipment standards, the U.S. electronics industries would still not be on even footing with the Canadian industries.

The industrial machinery industry, which has been suffering over the last few years, but which has been recovering recently, could be a real winner from the FTA. Tairiffs on this equipment are strict (see Table 1), and the FTA's eventual elimination of these tariffs should open the Canadian market.

Because of Maine's geographic proximity to Canada, the liberalization of trade, through the approval of the FTA, may allow even small companies to consider shipping their products north.

END

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